ONTARIO MINISTRY OF ENVIRONMENT
36936000023788

# 1970

# OPERATING SUMMARY

# BERTIE

# water treatment plant

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Water management in Ontario

Ontario
Water Resources
Commission

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Toronto 195
Ontario

Once again we have the privilege of submitting to you our latest detailed report on financial progress and technical activity at your water treatment plant.

The statistical information contained in this annual operating summary will undoubtedly be a useful barometer of efficiency. Of particular interest will be the comments and recommendations of the regional operations engineer, who was intimately connected with day-to-day operation throughout 1970.

Together with the extensive cost data provided, this information should assist greatly in your general understanding of the problems met and dealt with, and in furnishing a yardstick for possible future expansion.

D S Caverly

D.S. Caverly,
General Manager.

D McTavish

D.A. McTavish, P. Eng.,
Director,
Division of Plant Operations.

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# BERTIE

# water treatment plant

operated for

THE TOWNSHIP OF BERTIE

by the

ONTARIO WATER RESOURCES COMMISSION

# 1970 ANNUAL OPERATING SUMMARY

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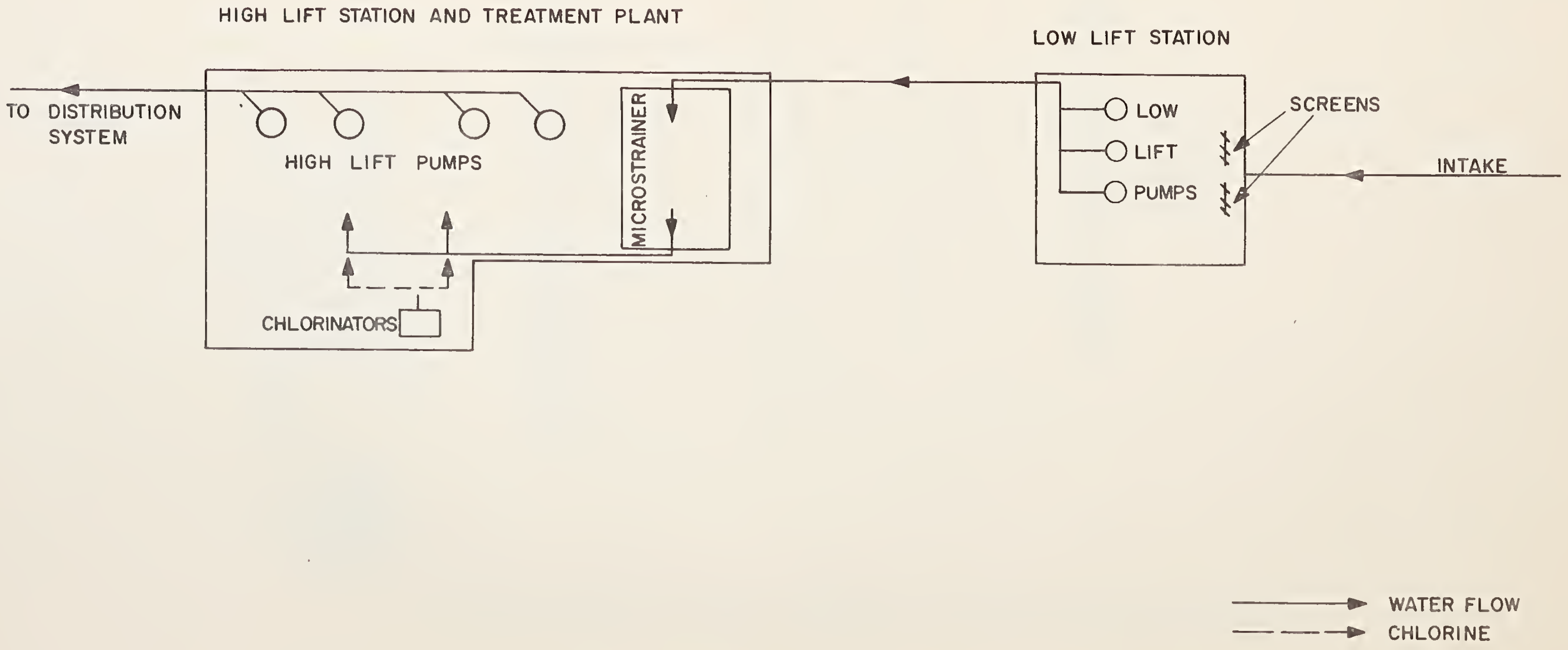


FLOW DIAGRAM

BERTIE TOWNSHIP WATER TREATMENT PLANT

# DESIGN DATA

PROJECT NO. 6-0047-59

NOMINAL CAPACITY 4.5 mgd RAW WATER SOURCE Lake Erie

## INTAKE

7 ft dia corrugated metal bellmonth intake in 15' sq timber crib

### Depth

17 ft

### Intake Pipe

Size: 1800 ft of 42" dia corrugated metal pipe
Velocity: 0-87 ft/sec @ 4.5 mgd

## LOW LIFT PUMPING STATION

### Pump Wells

Size: Two 13' x 10' x 24' swd (0.39 mil gal)

### Screens

Coarse screens, 5' x 5' with 0.1" dia wire mesh at 3/8" centres (two per well)

### Low Lift Pumps

Type: Worthington vertical turbine
Size: Three 2100 gpm @ 25' tdh ( @ 3 mgd each)

### Microstrainer

Type: Glenfield & Kennedy with Mark O fabric (165,000 openings per 52 inch)
Size: One 10' dia x 10' long
Capacity: 4.5 mgd

### Clearwell

Size: 0.125 mil gal

### High Lift Pumps

Type: Worthington centrifugal, single stage
Size: Two 2100 gpm @ 254' tdh
One 1300 gpm @ 254' tdh
One 500 gpm @ 254' tdh

## CHLORINATION

Pre & Post chlorination
Two W & T v-notch chlorinators
Type: A-731

## STORAGE

Elevated tank (Crescent Park) 0.21 mil gal
Standpipe (Ridgeway) 0.17 mil gal
Standpipe (Stevensville) 0.17 mil gal
Elevated Tank (Jockey Club-Private) 0.21 mil gal

# '70 REVIEW

| FLOWS | DAILY FLOW mil gal | OCCURRING IN THE MONTH OF | MONTHLY FLOW mil gal | OCCURRING IN THE MONTH OF |
|---|---|---|---|---|
| Average | 1.37 | — | 41.8 | — |
| High | 3.3 | July, August | 70.6 | July |
| Low | .85 | September | 25.4 | September |

## GENERAL

Repairs to the low voltage feeder cables (from the 1,000 K.V.A. transformer to the plant electrical panel) were completed in 1970. The cables have been a source of trouble for a number of years and it is believed that the insulation, in places, on a number of these cables had been damaged during initial construction. Estimates received from various electrical contractors in 1967 and 1968 indicated that the costs to completely replace the cables, would be approximately $16,000. It is anticipated that the repaired cables will now suffice until plant expansion is underway sometime in 1972 or 1973.

The Regional Municipality of Niagara assumed responsibility for the operation of this project in December, 1970. The OWRC operating staff at this plant was transferred to the Region at that time.

## PLANT FLOWS

During 1970, a total of 459.9 million gallons of water was supplied to the Municipality for an 11 month period. The average daily flow of 1.37 million gallons represents an increase of approximately 6% over 1969. The maximum daily flow of 3.3 million gallons occurred in both July and August.

## TURBIDITY

The Bertie Township Water Treatment Plant did not meet the OWRC standard for turbidity for treated water at any time during the year. The average treated water turbidity was 2.5 JTU which was approximately 17% less than the previous year. Under plant expansion in 1972 or 1973 high rate filters will be installed which will result in considerably better treatment and the production of a treated water which will meet all OWRC water quality standards.

## CHLORINATION and DISINFECTION

Analyses of raw water samples showed total coliform counts to be no greater than 320 at any time during the year. A total of 116 samples of treated water was taken and analyses indicated that the water was bacteriologically safe for human consumption. An average pre-chlorination dosage of 1.3 mg/l was required to maintain a 0.5 mg/l residual after a 15 minute retention period.

## WATER QUALITY

The treatment provided at this plant consists of coarse screening, microstraining, and disinfection only. As a result, the chemical properties of the treated water are almost identical to those of the raw water.

In general, the treated water is moderately hard and contains iron and colour in excess of the recommended limits (0.3 mg/l and 5 units respectively). The relatively high levels experienced do not impair the quality of the water, and it remains potable.

## CONCLUSIONS

Generally, the plant produced a good quality treated water meeting most OWRC requirements with the exception of turbidity and on occasion colour and iron concentrations. The average daily flow of 1.37 million gallons was approximately 6% greater than the flows of the previous year.

Repairs to the low voltage feeder cables were completed and it is anticipated these cables will suffice until plant expansion sometime in 1972 or 1973.

# PROJECT COSTS

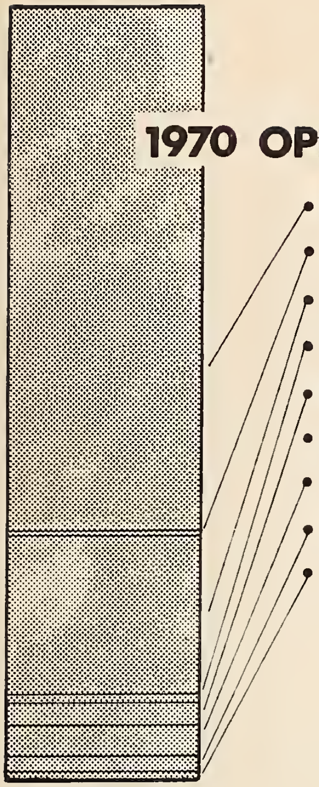
| | |
|---|---|
| NET CAPITAL COST (Final) | $763, 859. 80 |
| DEDUCT - Portion financed by CMHC/MDLB (Final) | - |
| Long Term Debt to OWRC | $763, 859. 80 |
| Debt Retirement Balance at Credit (Sinking Fund) December 31, 1970 | $191, 318. 45 |

| | |
|---|---|
| Net Operating | $ 56, 256. 95 |
| Debt Retirement | 15, 415. 00 |
| Reserve | 3, 077. 04 |
| Interest Charged | 42, 796. 17 |
| TOTAL | $117, 545. 16 |

## RESERVE ACCOUNT

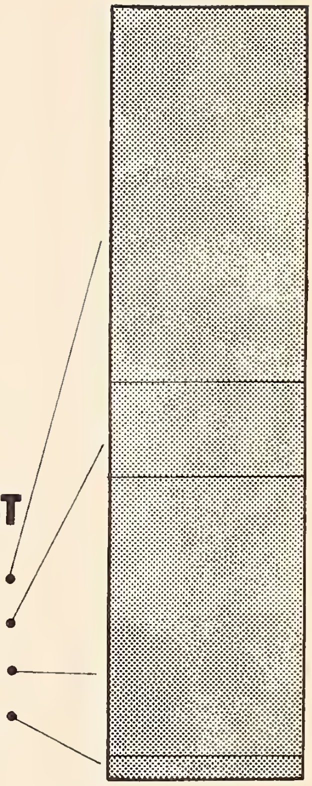
| | |
|---|---|
| Balance @ January 1, 1970 | $ 48, 229. 94 |
| Deposited by Municipality | 3, 077. 04 |
| Interest Earned | 3, 184. 85 |
| | $ 54, 491. 83 |
| Less Expenditures | - |
| Balance @ December 31, 1970 | $ 54, 491. 83 |

## 1970 OPERATING COSTS



| | |
|---|---|
| PAYROLL | 68 % |
| FUEL | 1 % |
| POWER | 20 % |
| CHEMICALS | 1 % |
| GENERAL SUPPLIES | 2 % |
| EQUIPMENT | < 1 % |
| REPAIRS & MAINTENANCE | 4 % |
| SUNDRY | 2 % |
| TRAVEL | 1 % |

## TOTAL ANNUAL COST



| | |
|---|---|
| NET OPERATING | 48 % |
| DEBT RETIREMENT | 13 % |
| INTEREST | 36 % |
| RESERVE FUND | 3 % |

## Yearly Operating Costs

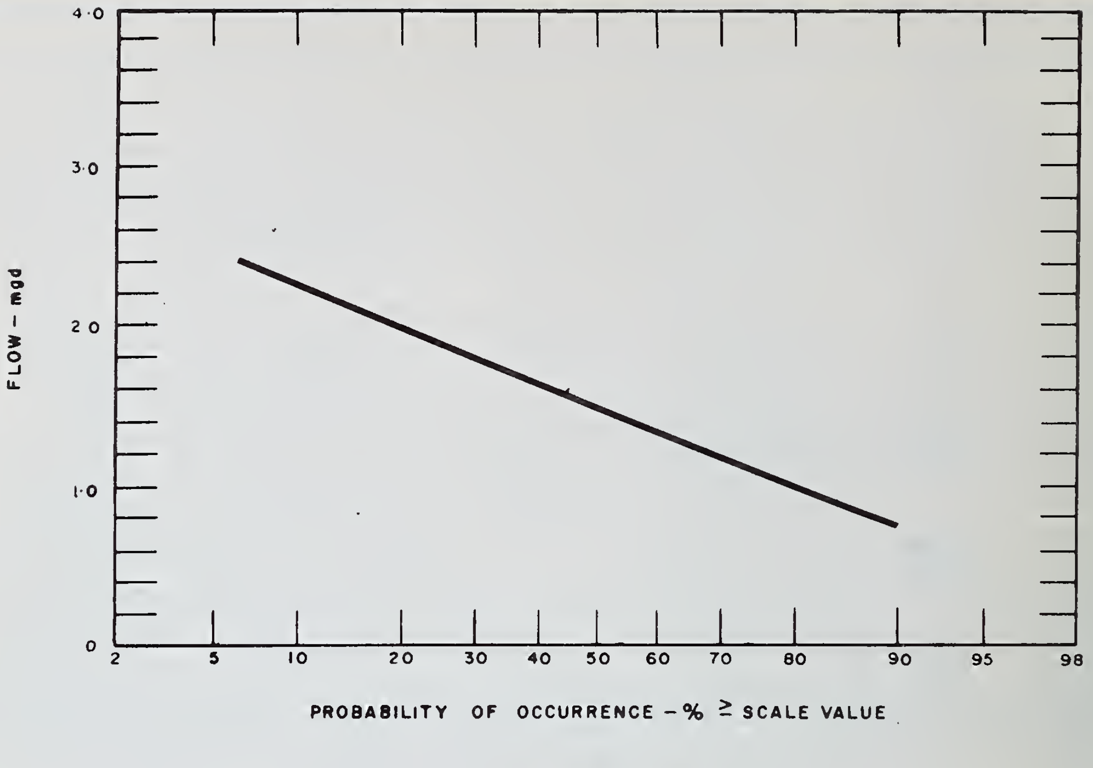
| YEAR | MILLION GALLONS TREATED | TOTAL OPERATING COSTS | COST PER THOUSAND GALLONS |
|---|---|---|---|
| 1966 | 469.93 | $45,349.85 | 10 cents |
| 1967 | 506.22 | 46,873.97 | 9 cents |
| 1968 | 512.31 | 50,998.06 | 10 cents |
| 1969 | 469.32 | 55,221.91 | 12 cents |
| 1970 | 500.1 (est.) | 56,256.95 | 11 cents |

# MONTHLY OPERATING COSTS

| MONTH | TOTAL EXPENDITURE | PAYROLL | CASUAL PAYROLL | FUEL | POWER | CHEMICALS | GENERAL SUPPLIES | EQUIPMENT | REPAIRS and MAINTENANCE | SUNDRY | TRAVEL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| JAN | 4793.53 | 4115.38 | 332.25 | - | - | - | 41.12 | - | 301.28 | 3.50 | - |
| FEB | 4259.15 | 2895.01 | 78.43 | 220.53 | 903.96 | - | 71.63 | - | 55.81 | 45.99 | (12.21) |
| MAR | 4196.71 | 2850.82 | 165.91 | 168.32 | 864.37 | - | 89.83 | - | - | 23.41 | 34.05 |
| APR | 4720.56 | 2844.10 | 102.38 | 160.98 | 859.28 | 47.50 | 48.82 | - | 523.26 | 11.23 | 123.01 |
| MAY | 5105.83 | 3226.09 | 173.85 | 150.38 | 904.00 | - | 7.40 | - | 450.53 | 68.58 | 125.00 |
| JUNE | 4384.56 | 2858.24 | 205.62 | 78.78 | 891.75 | 47.50 | 124.93 | - | 46.93 | 77.18 | 53.63 |
| JULY | 4686.26 | 2788.34 | 465.41 | 21.38 | 1053.67 | - | 50.50 | 152.25 | 66.93 | 47.88 | 39.90 |
| AUG | 6312.54 | 4188.16 | 475.17 | 8.18 | 1250.34 | 224.78 | 66.95 | - | - | 60.71 | 38.25 |
| SEPT | 4988.26 | 2823.73 | 110.32 | 5.34 | 1484.97 | - | 104.00 | - | - | 459.90 | - |
| OCT | 4755.49 | 2794.69 | 205.62 | 8.58 | 1125.07 | - | 187.31 | - | 336.45 | 26.07 | 71.70 |
| NOV | 4664.56 | 2843.18 | 205.62 | 24.58 | 1010.22 | 292.50 | 70.21 | - | 90.46 | 18.59 | 109.20 |
| DEC | 3389.50 | 1098.01 | 202.85 | 58.36 | 1004.81 | 292.50 | 154.68 | - | 401.74 | 133.05 | 43.50 |
| TOTAL | 56256.95 | 35325.75 | 2723.43 | 905.41 | 11352.44 | 904.78 | 1017.38 | 152.25 | 2273.39 | 976.09 | 626.03 |

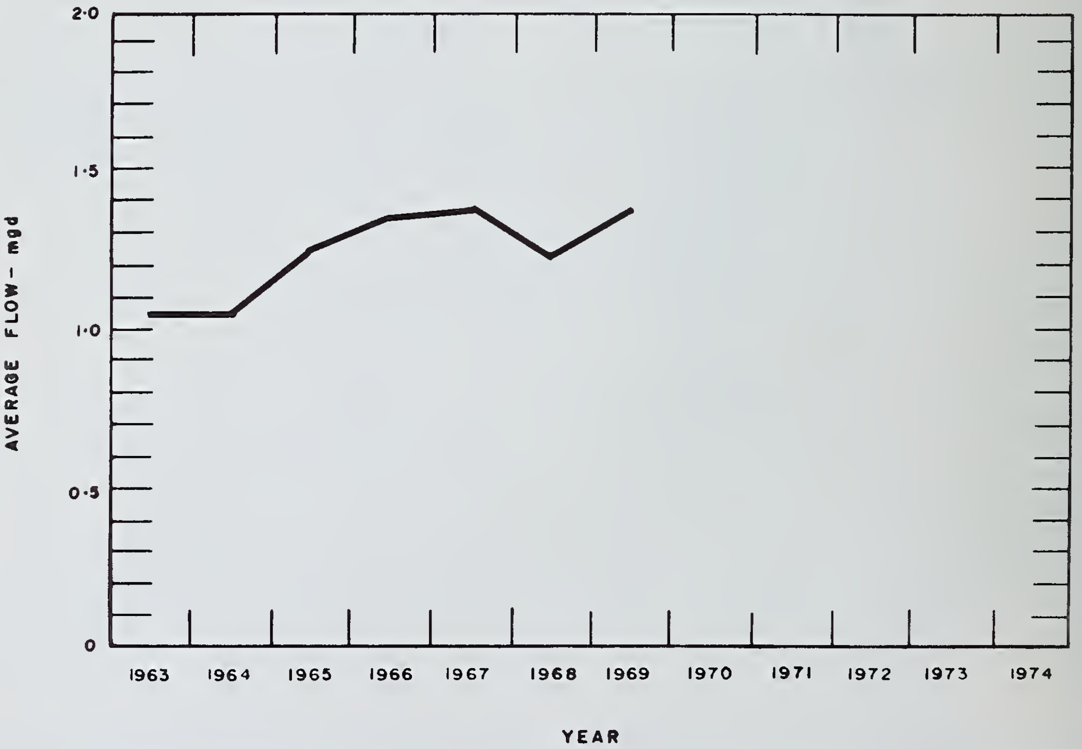
BRACKETS INDICATE CREDIT

# PROCESS DATA



# FLOWS

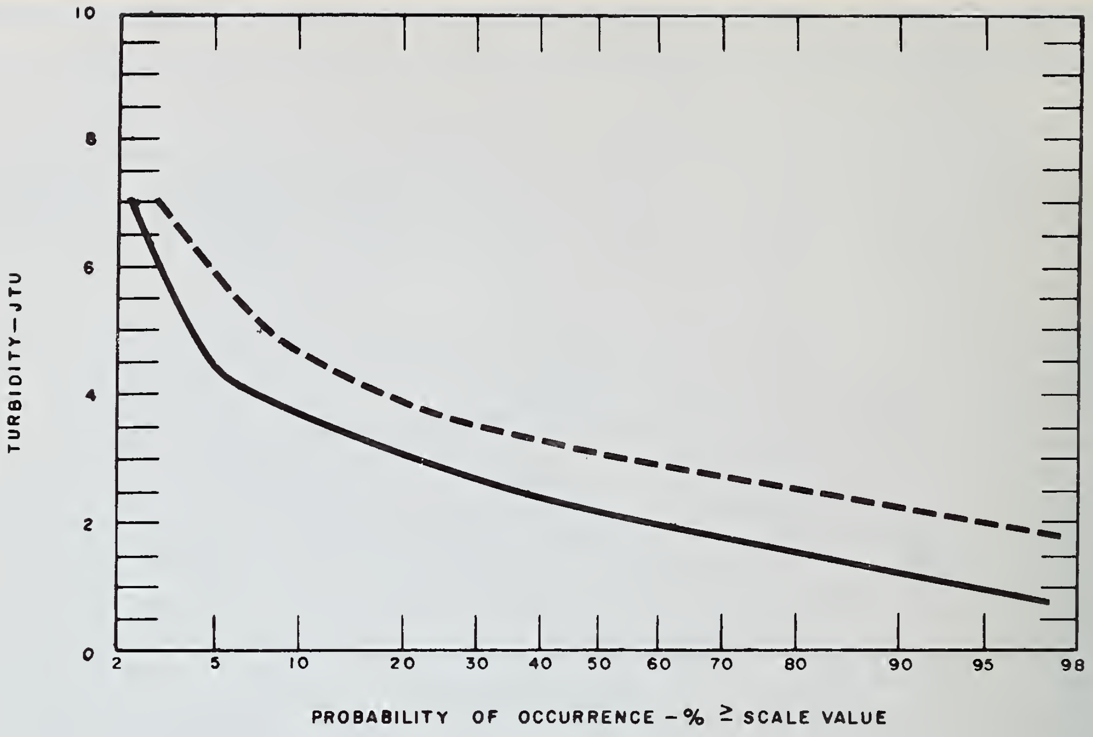
NOMINAL CAPACITY 4·5 MGD



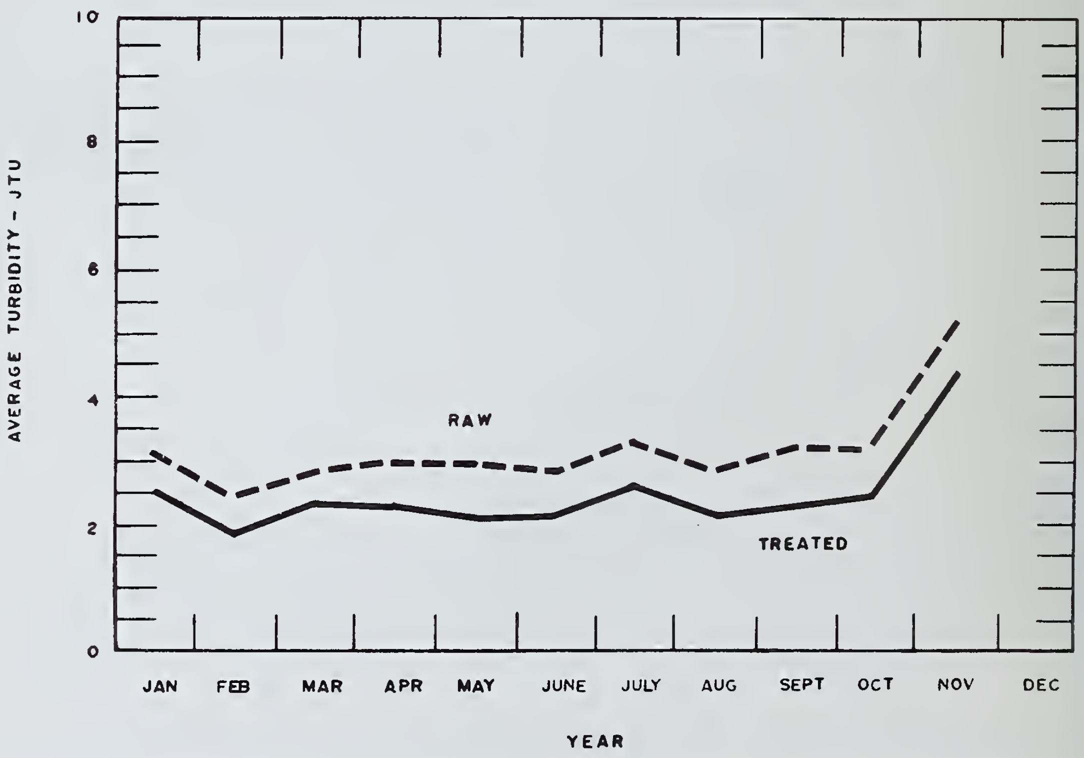
# PLANT FLOWS

| MONTH | TOTAL PLANT OUTPUT mil gal | AVERAGE DAILY FLOW mil gal | MAXIMUM RATE mgd | MAXIMUM DAILY FLOW mil gal | MAXIMUM 3-DAYS' FLOW mgd |
|---|---|---|---|---|---|
| JANUARY | 27.4 | .88 | 2.7 | 1.0 | 1.0 |
| FEBRUARY | 25.8 | .92 | 2.8 | 1.6 | 1.3 |
| MARCH | 31.1 | 1.00 | 3.1 | 1.5 | 1.4 |
| APRIL | 33.0 | 1.10 | 3.9 | 1.6 | 1.4 |
| MAY | 38.7 | 1.25 | 3.5 | 1.8 | 1.6 |
| JUNE | 62.5 | 2.09 | 4.4 | 2.9 | 2.9 |
| JULY | 70.6 | 2.27 | 5.5 | 3.3 | 3.1 |
| AUGUST | 68.8 | 2.22 | 6.0 | 3.3 | 3.1 |
| SEPTEMBER | 25.4 | .85 | 3.7 | 1.3 | 1.2 |
| OCTOBER | 38.8 | 1.25 | 3.7 | 1.6 | 1.5 |
| NOVEMBER | 37.8 | 1.26 | 3.0 | 1.3 | 1.3 |
| DECEMBER | NO | RECORDS | | | |
| TOTAL | 459.9* | | | | |
| AVERAGE | | 1.37 | (MAXIMUM VALUES FOR THE YEAR)<br>6.0 | 3.3 | 3.1 |

* Total flow for 11 months


TURBIDITY—JTU
0
2
4
6
8
10
2
5
10
20
30
40
50
60
70
80
90
95
98
PROBABILITY OF OCCURRENCE —% ≥ SCALE VALUE

# TURBIDITY


AVERAGE TURBIDITY - JTU
0
2
4
6
8
10
RAW
TREATED
JAN
FEB
MAR
APR
MAY
JUNE
JULY
AUG
SEPT
OCT
NOV
DEC
YEAR

# CHEMICAL CHARACTERISTICS

| PROPERTY | RAW WATER | | | | PLANT EFFLUENT | | | | DESIRABLE STANDARDS |
|---|---|---|---|---|---|---|---|---|---|
| | Number of Samples | Average | Maximum | Minimum | Number of Samples | Average | Maximum | Minimum | |
| HARDNESS mg/l as $CaCO_3$ | 8 | 134 | 148 | 128 | 9 | 137 | 146 | 130 | 80 – 100 |
| ALKALINITY mg/l as $CaCO_3$ | 9 | 102 | 112 | 95 | 9 | 100 | 108 | 94 | 30 – 100 |
| IRON mg/l Fe | 9 | .20 | .45 | .01 | 9 | .15 | .45 | .05 | $< 0.3$ |
| CHLORIDE mg/l $Cl^-$ | 9 | 29 | 54 | 24 | 9 | 27 | 28 | 24 | $< 250$ |

# CHLORINATION and DISINFECTION

| MONTH | RAW WATER | | | | | PLANT EFFLUENT | | DISTRIBUTION SYSTEM | | CHLORINATION | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NUMBER OF SAMPLES WITH COLIFORMS PER 100 ml OF: | | | | | No. of Samples Taken | No. with Coliform Organisms | No. of Samples Taken | No. with Coliform Organisms | CHLORINE USED lb | DOSAGE | | RESIDUAL in Plt. Eff mg/l |
| | 0 | 1 - 4 | 4 - 32 | 32-320 | > 320 | | | | | | pre- mg/l | post mg/l | |
| JAN | 1 | 1 | 2 | | | 4 | 0 | 11 | 1 | 285 | 1.1 | 0 | .5 |
| FEB | | 2 | 2 | | | 4 | 0 | 12 | 0 | 295 | 1.1 | 0 | .5 |
| MAR | | | | | | 0 | 0 | 0 | 0 | 387 | 1.3 | 0 | .5 |
| APR | | | | | | 0 | 0 | 0 | 0 | 381 | 1.2 | 0 | .5 |
| MAY | 1 | 1 | 1 | 1 | | 4 | 0 | 12 | 0 | 457 | 1.2 | 0 | .5 |
| JUNE | 3 | 2 | | | | 5 | 0 | 15 | 0 | 827 | 1.3 | 0 | .5 |
| JULY | 1 | 2 | 1 | 1 | | 3 | 0 | 12 | 0 | 1016 | 1.4 | 0 | .5 |
| AUG | | 2 | 2 | | | 4 | 0 | 12 | 0 | 1176 | 1.8 | 0 | .5 |
| SEPT | | | 5 | | | 5 | 0 | 15 | 0 | 559 | 1.4 | 0 | .5 |
| OCT | | | 1 | 3 | | 4 | 0 | 12 | 0 | 480 | 1.5 | 0 | .5 |
| NOV | | | 4 | 1 | | 5 | 0 | 15 | 0 | 431 | 1.1 | 0 | .5 |
| DEC | NO RECORDS | | | | | | | | | | | | |
| TOTAL | | | | | | 38 | 0 | 116 | 1 | 6294 | | | |
| AVERAGE | (NOTE: Geometric Mean)<br>5·6 COLIFORMS/100 ml | | | | | | | | | 572 | 1.3 | 0 | .5 |

# PHYSICAL CHARACTERISTICS

| MONTH | TURBIDITY Jackson Turbidity Units | | COLOUR Apparent Colour Units | | TEMPERATURE Fahrenheit Degrees | |
|---|---|---|---|---|---|---|
| | RAW WATER | PLANT EFFLUENT | RAW WATER | PLANT EFFLUENT | AVERAGE | MAXIMUM |
| JANUARY | 3.1 | 2.5 | <5 | <5 | 34 | 35 |
| FEBRUARY | 2.5 | 1.9 | <5 | <5 | 34 | 34 |
| MARCH | 2.9 | 2.4 | <5 | <5 | 34 | 34 |
| APRIL | 3.0 | 2.4 | <5 | <5 | 35 | 36 |
| MAY | 3.0 | 2.1 | 10 | <5 | 46 | 51 |
| JUNE | 2.9 | 2.2 | - | - | 57 | 61 |
| JULY | 3.4 | 2.6 | - | - | 67 | 71 |
| AUGUST | 2.8 | 2.2 | <5 | <5 | 72 | 73 |
| SEPTEMBER | 3.3 | 2.4 | <5 | <5 | 69 | 73 |
| OCTOBER | 3.3 | 2.5 | <5 | <5 | 60 | 63 |
| NOVEMBER | 5.2 | 4.4 | <5 | <5 | 50 | 54 |
| DECEMBER | NO | RECORDS | | | | |
| AVERAGE | 3.2 | 2.5 | <5 | <5 | 51 | |
| MAXIMUM | 5.2 | 4.4 | 10 | <5 | | 73 |

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BERTIE - OPERATING SUMMARY 1970
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